AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended): A turbo decoder having a state metric, comprising:

branch metric calculation means for calculating a branch metric by receiving symbols through an input buffer;

state metric calculation means for calculating a reverse state metric by using the calculated branch metric at said branch metric calculating means, storing the reverse state metric in a memory, calculating a forward state metric; and

log likelihood ratio calculation means for calculating a log likelihood ratio by receiving the forward state metric from said state metric calculation means and reading the reverse state metric saved at a memory in said state metric calculation means~~.~~,

wherein the log likelihood ratio L_k is calculated by using an equation

$\mathop{\mathring{A}}_{m=0}^{2^{-?1},P}(A_k^{1,m}+B_k^{s(m)}) - \mathop{\mathring{A}}_{m=0}^{2^{-?1},P}(A_k^{0,m}+B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; $s(m)$ is a function a number complemented a Most Significant Bit(MSB)of binary number of m; $\mathop{\mathring{A}}_{j=0}^{,P}$ is a function defined as $\mathop{E}_{j=0}^{1} A_k^j = A_k^0 \; E \; A_k^1 = \log_e(e^{A_k^0} + e^{A_k^1})$; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^{m} is a k^{th} reverse state metric with state m.

Claim 2 (Currently Amended): The turbo decoder in recited as claim 1, wherein said state metric calculation means includes:

reverse state metric calculation means for calculating a reverse state metric in case an input i is 0 according to states of the branch metric; and

forward state metric calculation means for calculating a forward state metric in case an input i is 0 ~~and~~ or in case the input i is 1 according to states of the branch metric.

Claim 3 (Currently Amended): A calculation method implemented to ~~the~~ a turbo decoder, comprising steps of:

a) calculating a branch metric by receiving symbols;

b) calculating a reverse state metric in case an input i is 0 by using the calculated branch metric and saving the calculated reverse state metric in a memory;

c) calculating a forward state metric in case an input i is 0 ~~and~~ or in case the input i is 1 by using the calculated branch metric;

d) calculating a log likelihood ratio by using the forward state metric and the reverse state metric; and

e) storing the log likelihood ratio~~.~~,

wherein the log likelihood ratio L_k is calculated by using an equation

$\overset{2^{-?}|,P}{\underset{m=0}{A}} (A_k^{1,m} + B_k^{s(m)}) - \overset{2^{-?}|,P}{\underset{m=0}{A}} (A_k^{0,m} + B_k^{m})$ wherein m is a state of a trellis diagram; $s(m)$ is a function provides a number complemented a Most Significant Bit(MSB)of binary number of m; $\overset{,P}{\underset{j=0}{A}}$ is a function defined as $\overset{1}{\underset{j=0}{E}} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0} + e^{A_k^1})$; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; k is a stage; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^m is a k^{th} reverse state metric with state m.

Claim 4 (Currently Amended): The calculation method as recited in claim 3, wherein the reverse state metric B_k^m, which is k^{th} reverse state metric with state *m*, is calculated by using an equation $\mathop{\mathring{A}}_{j=0}^{,P} (B_{k+1}^{F(j,m)} + D_{k+1}^{j,f(m)})$, wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a $(k-1)^{th}$ input for a reverse state metric; *f(m)* is the state of $(k+1)^{th}$ stage related to *the state m of* k^{th} stage ~~*f(m)* is $(k+1)^{th}$ state related to k^{th} state with state *m*~~ ; *F(j,m)* is a function defined as *F(j,m)=f(m)* for *j=0* and *F(j,m) = s(f(m))* for *j=1*; *s(m)* is a function provides a number complemented for a Most Significant Bit(MSB) of binary number of m ~~binary number of m with a most significant bit complemented~~; $\mathop{\mathring{A}}_{j=0}^{,P}$ is a function defined as $\mathop{E}_{j=0}^{1} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0} + e^{A_k^1} \cancel{-e^{A_k^0}})$; $B_{k+1}^{F(j,m)}$ is a $(k+1)^{th}$ reverse state metric with state *F(j,m)* and $D_{k+1}^{j,f(m)}$ is *(k+1)th* branch metric with state *m* and $(k+1)^{th}$ input.

Claim 5 (Currently Amended): The calculation method as recited in claim 3, wherein the forward state metric A_k^m, which is k^{th} forward state metric with state *m*, is calculated by using an equation $\mathop{\mathring{A}}_{j=0}^{,P} (D_k^{j,b(j,m)} + A_{k-1}^{b(j,m)})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *b(j,m)* is the reverse state of the $(k-1)^{th}$ stage ~~a $(k-1)^{th}$ reverse state~~; *j* is a $(k+1)^{th}$ input for a reverse state metric; $\mathop{\mathring{A}}_{j=0}^{,P}$ is a function defined as $\mathop{E}_{j=0}^{1} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0} + e^{A_k^1} \cancel{-e^{A_k^0}})$; $A_{k-1}^{b(j,m)}$ is a $(k-1)^{th}$ forward state metric with state *b(j,m)*and $D_k^{j,b(j,m)}$ is k^{th} branch metric with state *b(j,m)*.

Claim 6 (Canceled)

Claim 7 (Currently Amended): The calculation method as recited in claim 3, wherein the reverse state metric B_k^m, which is k^{th} reverse state metric with state *m*, is calculated by using an equation $\overset{,P}{\underset{j=0}{2}} (B_{k+1}^{F(j,m)} + D_{k+1}^{j,f(m)})$, wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a $(k-1)^{th}$ input for a reverse state metric; *f(m)* is <u>a state of $(k+1)^{th}$ stage</u> ~~$(k+1)^{th}$ state~~ related to k^{th} state with state *m*; *F(j,m)* is a function defined as *F(j,m)=f(m)* for *j=0* and *F(j,m) = s(f(m))* for *j=1*; *s(m)* is a function provides <u>a number complemented for a Most Significant Bit(MSB) of binary number of m</u> ~~binary number of m with a most significant bit complemented~~; $\overset{,P}{\underset{j=0}{2}}$ is a function defined as

$\overset{,P}{\underset{j=0}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + \underline{e^{A_k^1}} - \cancel{e^{A_k^0}})$; $B_{k+1}^{F(j,m)}$ is a $(k+1)^{th}$ reverse state metric with state *F(j,m)* and $D_{k+1}^{j,f(m)}$ is *(k+1)th* branch metric with state *m* and $(k+1)^{th}$ input.

Claim 8 (Currently Amended): The calculation method as recited in claim 3, wherein the forward state metric A_k^m, which is k^{th} forward state metric with state *m*, is calculated by using an equation $\overset{,P}{\underset{j=0}{2}} (D_k^{j,b(j,m)} + A_{k-1}^{b(j,m)})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *b(j,m)* is a $(k-1)^{th}$ reverse state; *j* is a $(k+1)^{th}$ input for a reverse state metric; $\overset{,P}{\underset{j=0}{2}}$ is a function defined as $\overset{,P}{\underset{j=0}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + \underline{2^{A_k^1}} - 2^{A_k^0})$; $A_{k-1}^{b(j,m)}$ is a $(k-1)^{th}$ forward state metric with state *b(j,m)*and $D_k^{j,b(j,m)}$ is k^{th} branch metric with state *b(j,m)*.

Claim 9 (Currently Amended): The calculation method as recited in claim 3, wherein the log likelihood ratio L_k is calculated by using an equation $\overset{2^{-?|,P}}{\underset{m=0}{2}}(A_k^{1,m}+B_k^{s(m)})$ - $\overset{2^{-?|,P}}{\underset{m=0}{2}}(A_k^{0,m}+B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; ~~j is a $(k-1)^{th}$ input for a reverse state metric;~~ $s(m)$ is a function provides <u>a number complemented for a Most Significant Bit(MSB) of binary number of m</u> ~~binary number of m with a most significant bit complemented~~; $\overset{,P}{\underset{j=0}{2}}$ is a function defined as $\overset{,P}{\underset{j=0}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + \underline{2^{A_k^1}}$ $2^{A_k^0})$; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; <u>j is a $(k-1)^{th}$ input for a reverse state metric;</u> $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^{m} is a k^{th} reverse state metric with state m.

Claim 10 (Currently Amended): A computer-readable recording medium storing instructions for executing a calculation method implemented to ~~the~~<u>a</u> turbo decoder, comprising functions of:

calculating a branch metric by receiving symbols;

calculating a reverse state metric in case an input i is 0 by using the calculated branch metric and saving the calculated reverse state metric in a memory;

calculating a forward state metric in case an input i is 0 ~~and~~ <u>or in case</u> the input i is 1 by using the calculated branch metric;

calculating a log likelihood ratio by using the forward state metric and the reverse state metric; and

storing the log likelihood ratio~~.~~<u>,</u>

wherein the log likelihood ratio L_k is calculated by using an equation

$\overset{2^{-?|,P}}{\underset{m=0}{A}} (A_k^{1,m} + B_k^{s(m)}) - \overset{2^{-?|,P}}{\underset{m=0}{A}} (A_k^{0,m} + B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $s(m)$ is a function provides binary number of m with a most significant bit complemented; $\overset{,P}{\underset{j=0}{A}}$ is a function defined as

$\overset{1}{\underset{j=0}{E}} A_k^j \equiv A_k^0 \, E \, A_k^1 = \log_e(e^{A_k^0} + e^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^{m} is a k^{th} reverse state metric with state m.

Claim 11 (New): The computer-readable recording medium as recited in claim 10, wherein the log likelihood ratio L_k is calculated by using an equation

$\overset{2^{-?|,P}}{\underset{m=0}{2}} (A_k^{1,m} + B_k^{s(m)}) - \overset{2^{-?|,P}}{\underset{m=0}{2}} (A_k^{0,m} + B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $s(m)$ is a function provides binary number of m with a most significant bit complemented; $\overset{,P}{\underset{j=0}{2}}$ is a function defined as

$\overset{,P}{\underset{j=0}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = \log_2(2^{A_k^0} + 2^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^{m} is a k^{th} reverse state metric with state m.

Claim 12 (New): The turbo decoder having a state metric as recited in claim 1, wherein the log likelihood ratio L_k is calculated by using an equation $\overset{2^{-?|,P}}{\underset{m=0}{2}} (A_k^{1,m} + B_k^{s(m)})$ - $\overset{2^{-?|,P}}{\underset{m=0}{2}} (A_k^{0,m} + B_k^{m})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a *(k-1)*th input for a reverse state metric; *s(m)* is a function provides binary number of m with a most significant bit complemented; $\overset{,P}{\underset{j=0}{2}}$ is a function defined as $\overset{,P}{\underset{j=0}{2}} A_k^j = A_k^0 2 A_k^1 = log_2(2^{A_k^0} + 2^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state *m* and input *1;* $B_k^{s(m)}$ is a k^{th} reverse state metric with state *s(m);* $A_k^{0,m}$ is a k^{th} forward state metric with state *m* and input *0* and B_k^{m} is a k^{th} reverse state metric with state *m.*